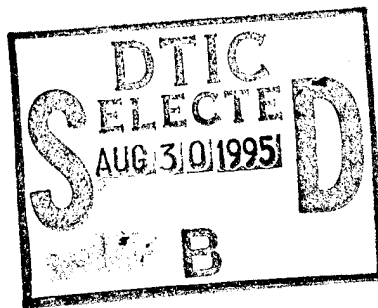


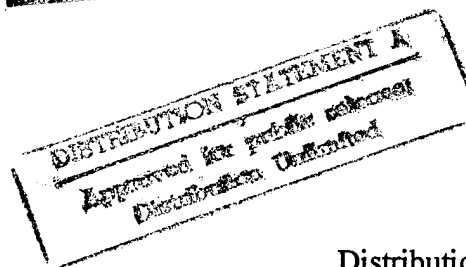
DECEMBER 1994

# REPORT NO. 95-06

## CONTAINER LOAD TRAILER (CLT) DEMONSTRATION



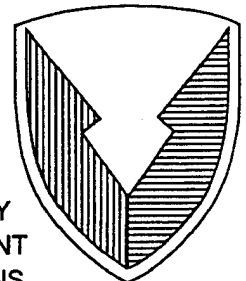
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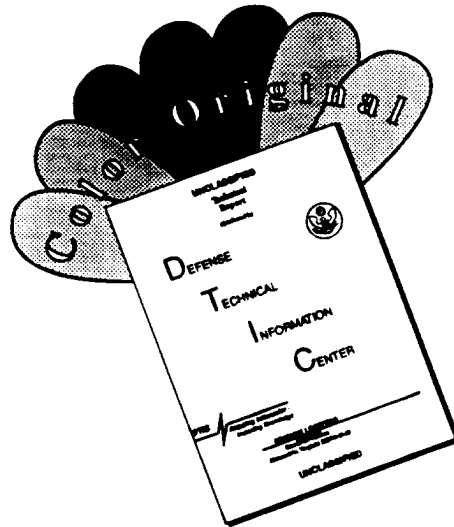
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19. ABSTRACT (Continue on reverse if necessary and identify by block number)  The U.S. Army Defense Ammunition Center and School (USADACS) conducted a demonstration of the Container Load Trailer (CLT) manufactured by ESCO Datron, Aston, PA. The CLT is a self-contained system capable of lifting International Organization for Standardization (ISO)-compatible containers by the ends for towing or by the sides for loading and unloading the container from a trailer. The CLT system consists of two units each with self-contained hydraulic systems powered by small diesel engines. Load capacity for the CLT is 50,000 pounds while the weight of the CLT is only approximately 12,600 pounds. Results from the demonstration indicated a few tolerance problems that would need to be studied before possible use of the system in ammunition logistics is considered.					
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U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL  
VALIDATION ENGINEERING DIVISION  
SAVANNA, IL 61074-9639

REPORT NO. 95-06

CONTAINER LOAD TRAILER (CLT) DEMONSTRATION

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## PART 1

### INTRODUCTION

A. BACKGROUND. The U.S. Army Defense Ammunition Center and School (USADACS) conducted a demonstration of the Container Load Trailer (CLT) manufactured by ESCO Datron, Aston, PA, 30 November and 1 December 1994. During the two-day demonstration, the CLT was put through a few container handling scenarios in order to assess the capabilities of the system for U.S. Army ammunition logistics system use. The CLT system, as demonstrated, consists of two separate units that can be attached to either end of an ISO-compatible container for towing or can be attached to either side of an ISO-compatible container in order to load or unload the container from a trailer. The CLT units both have stand-alone hydraulic units powered by small diesel engines with a load capacity of 50,000 pounds while only weighing approximately 12,600 pounds. The back section of the CLT system has a hydraulic maneuvering system which allows the back section to be effortlessly positioned by one person. The front section has no maneuvering system with the intention that the towing vehicle would back the front section into position for attachment to the MILVAN. In the event there is no vehicle to position the front section, the unit can be easily maneuvered with three people. The CLT system also has airbrakes on both units with an extension airhose to interconnect the units with the towing vehicle.

B. AUTHORITY. The test was accomplished IAW mission responsibilities delegated by U.S. Army Armament, Munitions and Chemical Command (AMCCOM). Reference is made to the following:

1. Change 4, 4 October 1974, to AR740-1, 23 April 1973, Storage and Supply Activity Operation.



2. AMCCOM-R 10-17, Mission and Major Functions of USADACS, 13 January 1986.

C. OBJECTIVE. To determine possible uses for the CLT handling ammunition-loaded ISO-compatible containers.

D. CONCLUSIONS. During the demonstration, the following factors affecting the suitability of the CLT for U.S. Army use were noted:

1. Tolerance problems with the T-bolts and the M872 semitrailer tiedown fittings will have to be investigated as well as potential problems with other trailers.

2. The vertical lift capability of the CLT should be studied if the system is to be used on trailers with a deck higher than the M872 semitrailer.

3. Modification of the CLT which would provide for more lateral clearance between the sides of the MILVAN and the CLT during side lifts without sacrificing the vertical lift capability should aid significantly in positioning trailers under the MILVAN.

4. Operation of the CLT on soft ground may prove difficult due to the small size dolly wheel on each section of the CLT system.



PART 2

30 NOVEMBER - 1 DECEMBER 1994

ATTENDEES

Quinn D. Hartman  
General Engineer  
DSN 585-8992  
815-273-8992

Director  
U.S. Army Defense Ammunition Center  
and School  
ATTN: SMCAC-DEV  
Savanna, IL 61074-9639

Jerome H. Krohn  
Supervisory General Engineer  
DSN 585-8929  
815-273-8929

Director  
U.S. Army Defense Ammunition Center  
and School  
ATTN: SMCAC-DEV  
Savanna, IL 61074-9639

William R. Frerichs  
Supervisory General Engineer  
DSN 585-8071  
815-273-8071

Director  
U.S. Army Defense Ammunition Center  
and School  
ATTN: SMCAC-DET  
Savanna, IL 61074-9639

Gregory L. Willis  
Industrial Engineer  
DSN 585-8075  
815-273-8075

Director  
U.S. Army Defense Ammunition Center  
and School  
ATTN: SMCAC-DET  
Savanna, IL 61074-9639

SGM Frank W. Brantley  
Logistics Management Specialist  
DSN 585-8050  
815-273-8050

Director  
U.S. Army Defense Ammunition Center  
and School  
ATTN: SMCAC-AV  
Savanna, IL 61074-9639

Kevin Mulligan  
610-494-8000

Engineered Systems  
A DATRON Company  
2550 Market Street  
Aston, PA 19014



Jon France  
DSN 793-5123  
309-782-5123

Commander  
U.S. Army Armament, Munitions  
and Chemical Command  
ATTN: AMSMC-TMP-G  
Rock Island, IL 61299-6000



## PART 3

### EVALUATION PROCEDURES

a. ROAD HAZARD COURSE. The CLT, transporting a 20-foot inertly-loaded MILVAN weighing 44,000 pounds, was pulled over a 200-foot-long segment of concrete road which consisted of two series of railroad ties projecting 6-inches above the level of the road surface. The load traversed the course two times, the first time at half-speed and the second time at 6.2 mph (see figure 1).

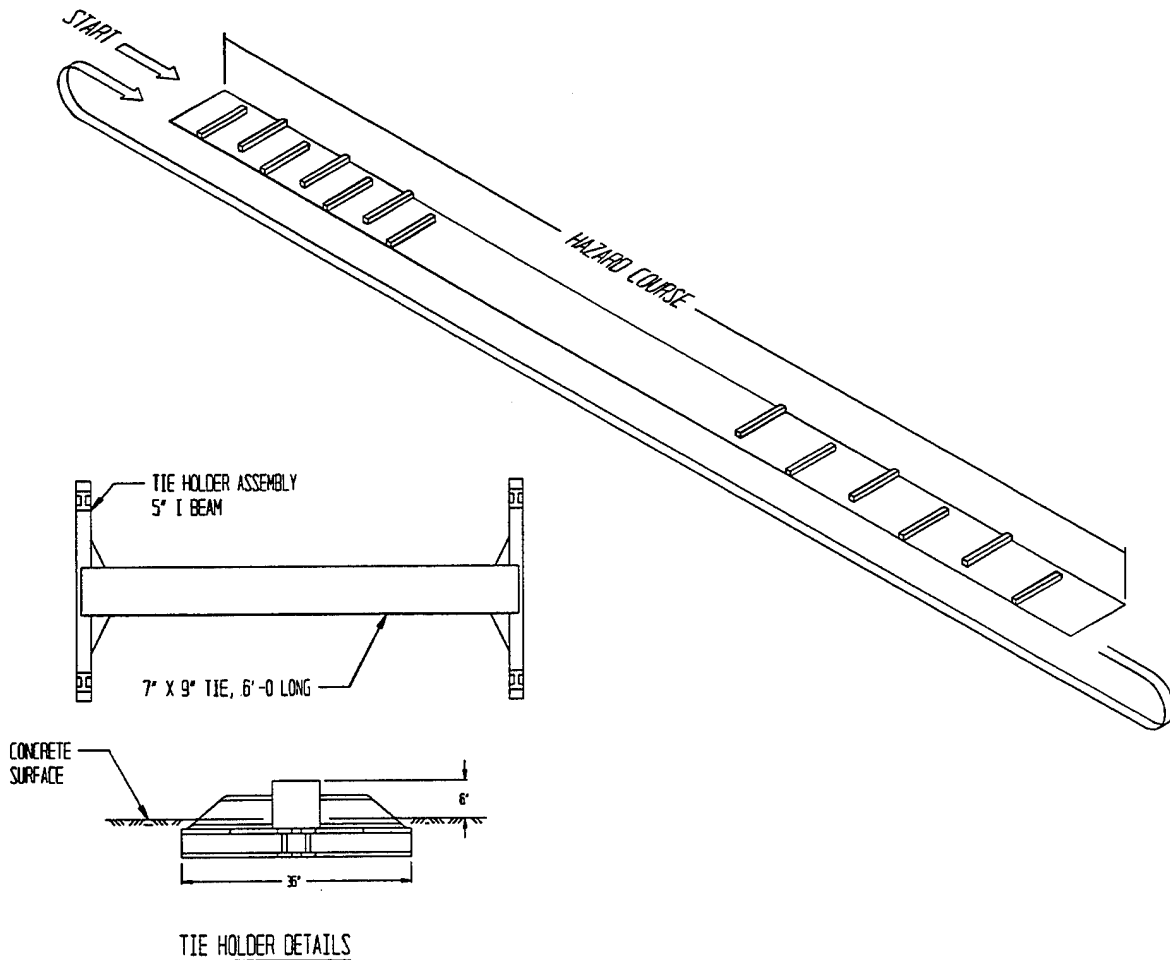


FIGURE 1



b. WASHBOARD COURSE. The CLT, transporting a 20-foot inertly-loaded MILVAN weighing 44,000 pounds, was pulled over the washboard course at a speed which produced the most violent response. The washboard course consists of a 300-foot-long section of rails embedded in concrete with two inches protruding above the concrete and spaced at intervals of 26-1/2-inches (see figure 2).

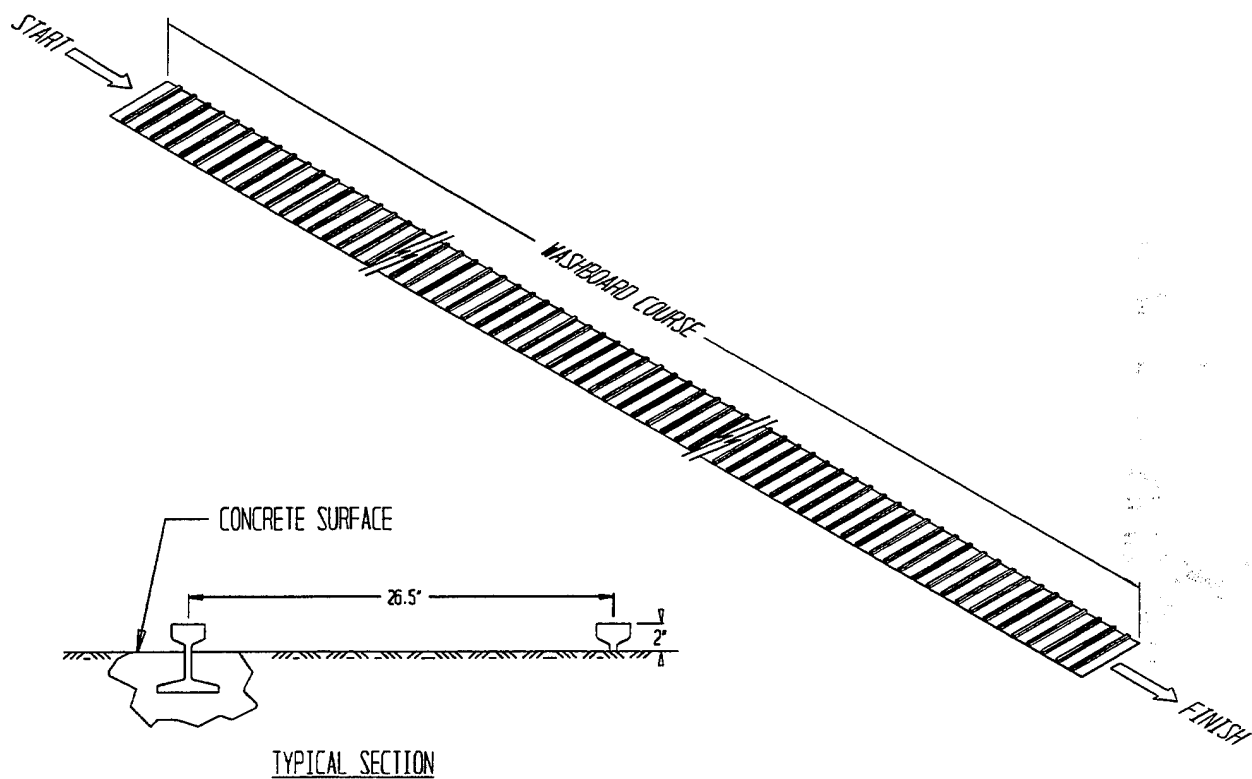


FIGURE 2



## PART 4

### RESULTS

During the demonstration, the CLT was put through a variety of container handling sequences that represented "real world" container handling scenarios. All container handling sequences were accomplished with a MILVAN loaded to a gross weight of 44,000 pounds. During the two-day demonstration, the CLT was used to pick up and trailer the MILVAN; pick up and load the MILVAN onto an M872 semitrailer; unload the MILVAN from an M872 semitrailer, and traverse the road hazard course. A demonstration of the CLT towing configuration used when transporting the CLT without a container was also performed.

a. End Pick Up and Towing of MILVAN. Results revealed no deficiencies of the CLT system. The CLT system easily interfaced with the MILVAN and had no difficulty in raising the MILVAN to transportation height. The timeframe to install the system in this configuration using three people would be approximately 5 to 10 minutes.

b. Side Lift Loading of MILVAN. Results revealed some clearance and positioning problems associated with backing a trailer into position under the MILVAN. Initially, the CLT system was not able to raise the MILVAN to the required height to back the trailer into position. The MILVAN had to be set back on the ground and all available slack was removed from the chains that attach the CLT units to the bottom ISO corner fittings. After the secondary adjustment, the CLT was able to lift the MILVAN to the necessary height. Trailers with a deck higher than an M872 semitrailer will probably be unable to be loaded with the CLT system. The second problem was due to minimal lateral clearance. The CLT units are positioned 6 - 8 inches beyond each side of the MILVAN during the side lift so that clearance for the trailer is minimal. Extreme care had to be exercised during the backing of the trailer due to the high center of



gravity (CG) and relatively narrow wheel base of the CLT units with a MILVAN elevated to the height of the trailer deck. The M872 semitrailer collided with the CLT units several times during positioning of the trailer, nearly tipping the MILVAN over. Once backed into position, additional problems arose while positioning the MILVAN onto the corner twist-lock fittings of the trailer. The problem was ultimately resolved by getting the trailer lined up with the front corner twist-lock fittings of the trailer and using the side shifting capabilities of the CLT units to position the MILVAN onto the rear twist-lock fittings. This procedure was only possible due to the fact that the M872 semitrailer has a deck that slopes towards the rear of the trailer. A similar type procedure would probably not work on a trailer with a level deck. The timeframe to install the CLT on the side of the MILVAN and raise it to the necessary height to back the trailer under would be approximately 10 to 15 minutes. Additional time would be required to position the trailer and that would vary significantly depending on the skill of the driver.

c. Side Lift Unloading of MILVAN. Results revealed some tolerance problems with the T-bolts that attach the CLT units to the lower ISO fittings on the MILVAN. During this phase of the demonstration, the MILVAN was placed onto the M872 semitrailer with a 50,000-pound container handler and removed with the CLT units. While attaching the CLT units to the MILVAN, a tolerance problem between the corner twist-lock fittings of the trailer and the T-bolts from the CLT were noted. The T-bolt could be inserted; however, it could not be rotated. Two of the four T-bolts had to be modified in order to complete the demonstration (see part 5). The tolerance problem was not noted during phase 2 of the demonstration due to the fact that the CLT units were not removed from the MILVAN. Installation time for this procedure would be similar to the previous procedure.

d. Road Hazard Course. The CLT system and MILVAN were pulled over the road hazard course and the washboard course in order to assess the capability of the CLT for transportation over rough terrain. The first pass over the road hazard course was performed at half-speed. The



second pass over the road hazard course was performed at 6.2 mph. During the last part of the demonstration, the CLT and MILVAN were pulled over the washboard course at 3.3 mph. The CLT operated smoothly over both courses without any deficiencies noted.

e. CLT Configured for Transport Without MILVAN. In this configuration, adaptors were inserted between the two units at the points where the CLT attaches to the bottom fittings on the MILVAN during end lifts. The same T-bolts that were used to fasten the CLT to the MILVAN were used to bolt both CLT units together, allowing the CLT to be connected to the vehicle for towing.



PART 5

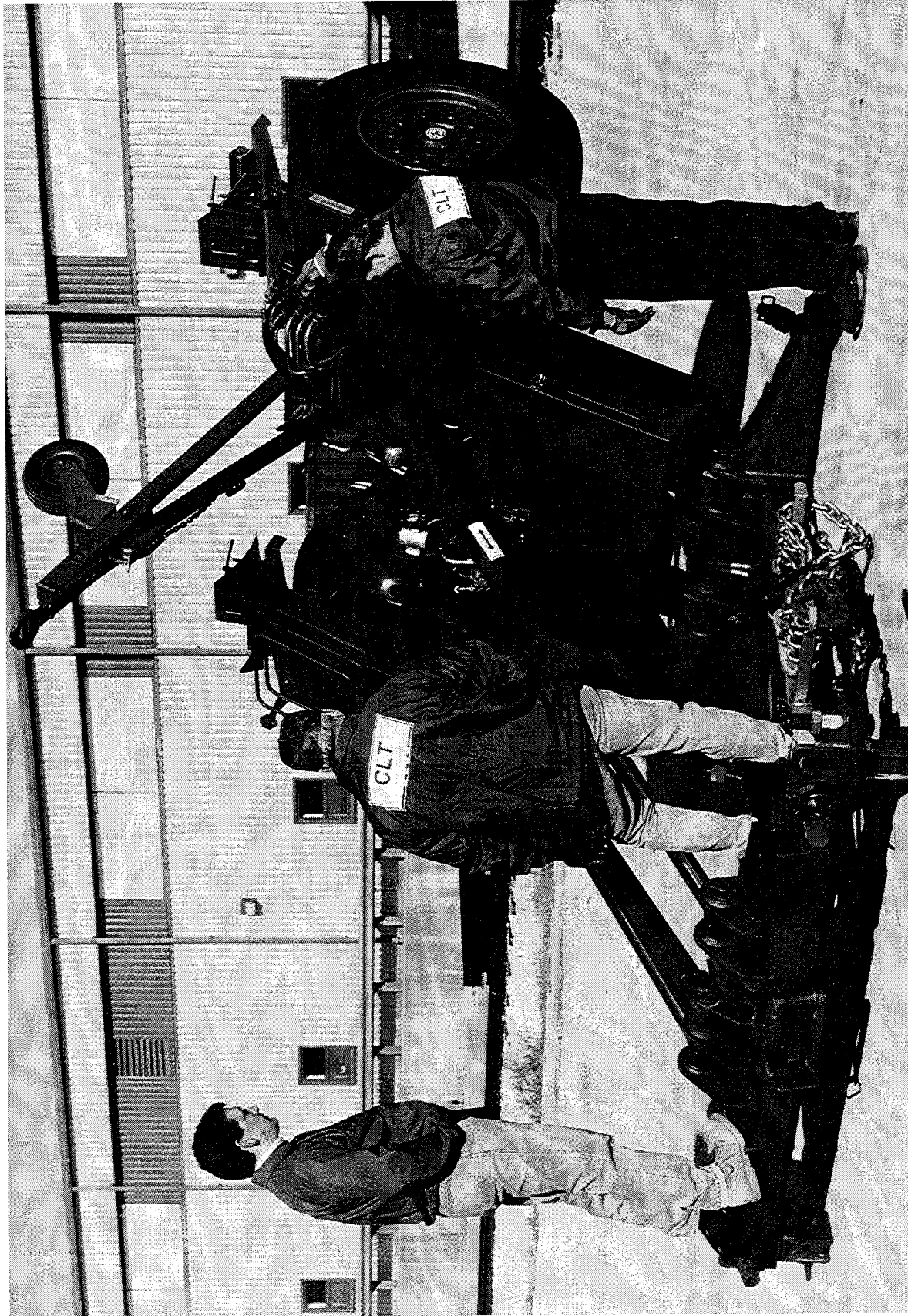
PHOTOGRAPHS





	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-359 - This photograph shows the CLT system being unfolded from the flat shipping position. Note personnel acting as a counterweight.		

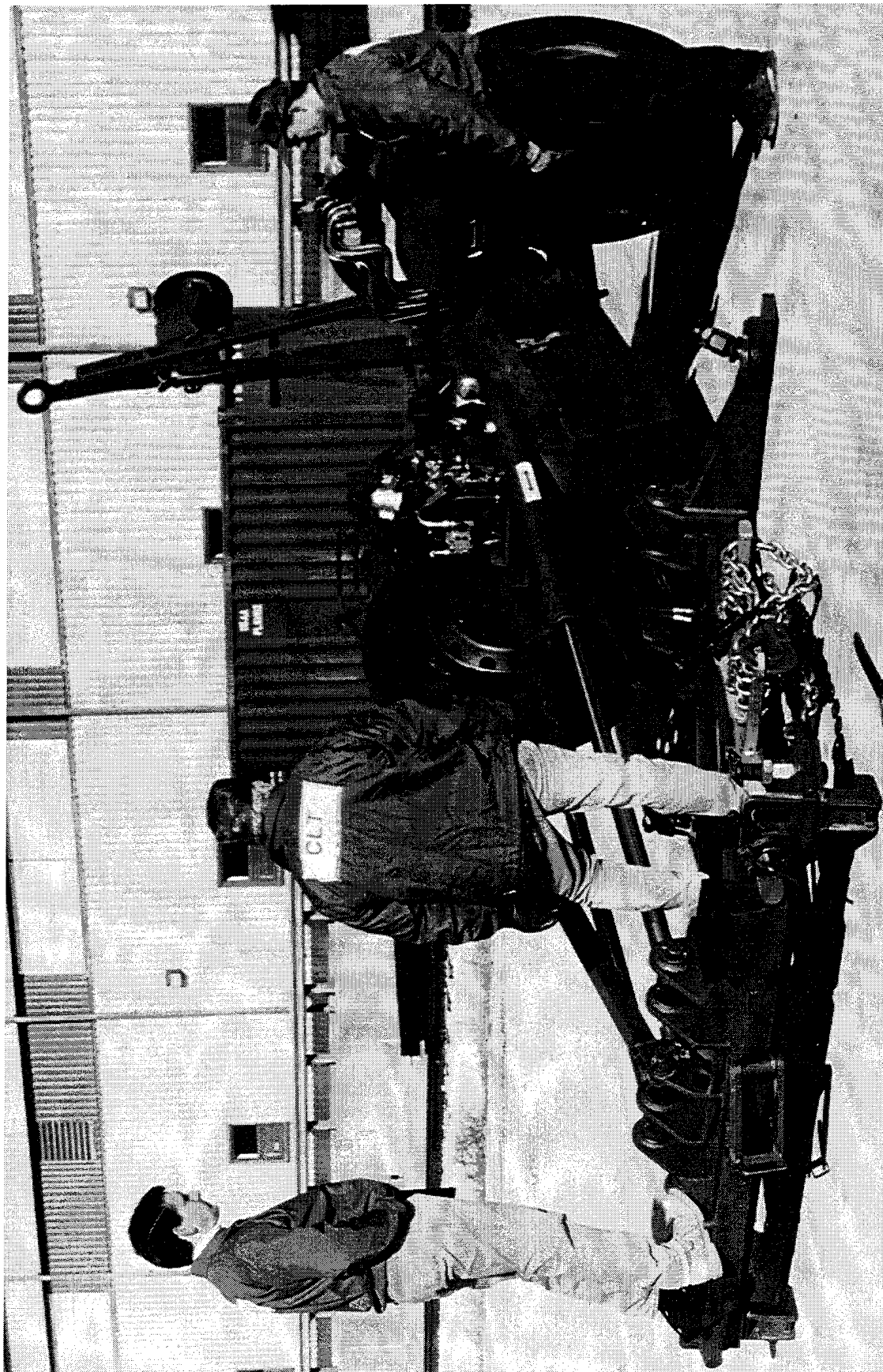




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SAVANNA, IL

AO317-SCN95-78-360 - This photograph shows the CLT system during the unfolding from the flat shipping position.

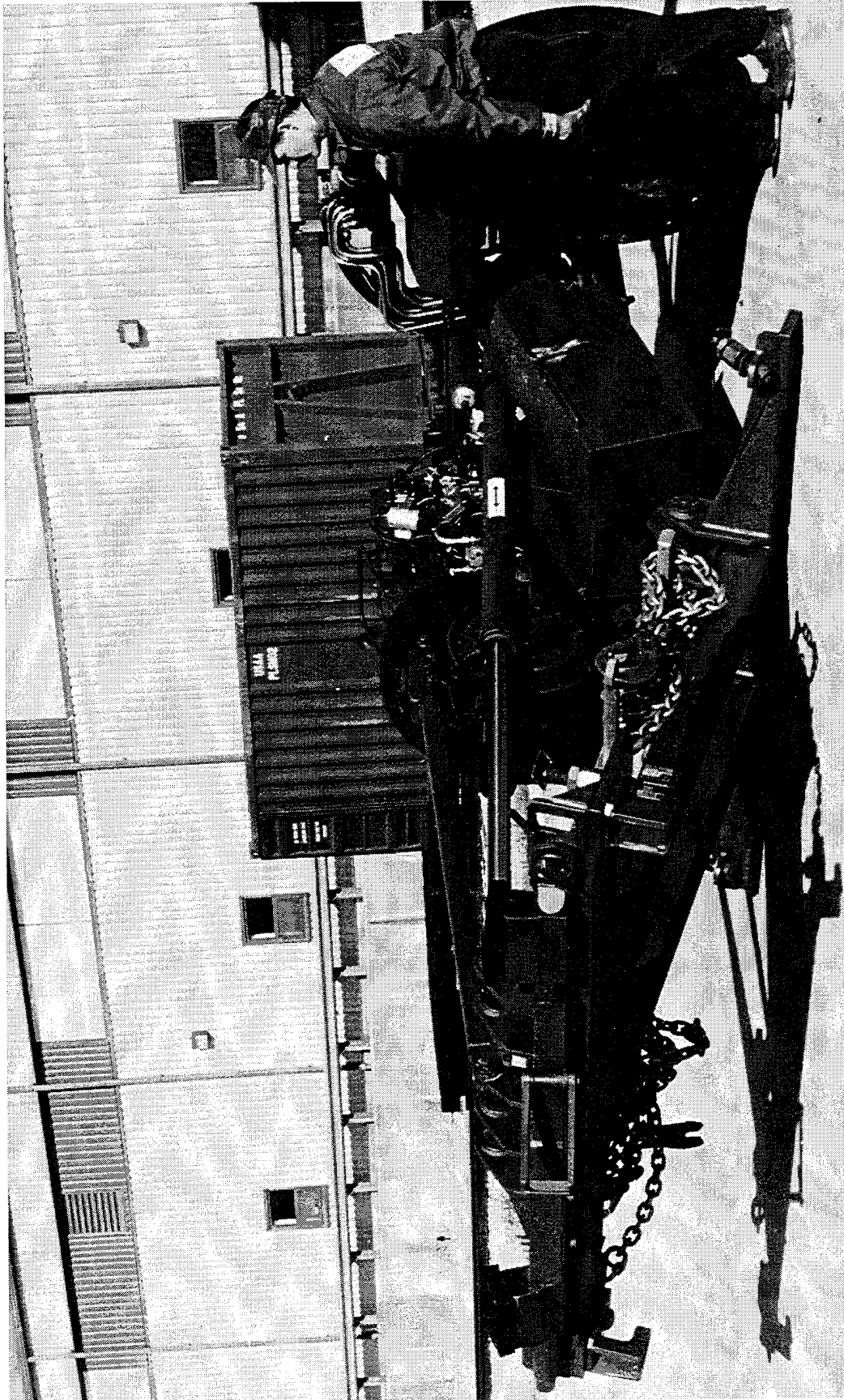




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SAVANNA, IL

AO317-SCN95-78-419 - This photograph shows the CLT system unfolded to the point where the main wheels have made contact with the ground.

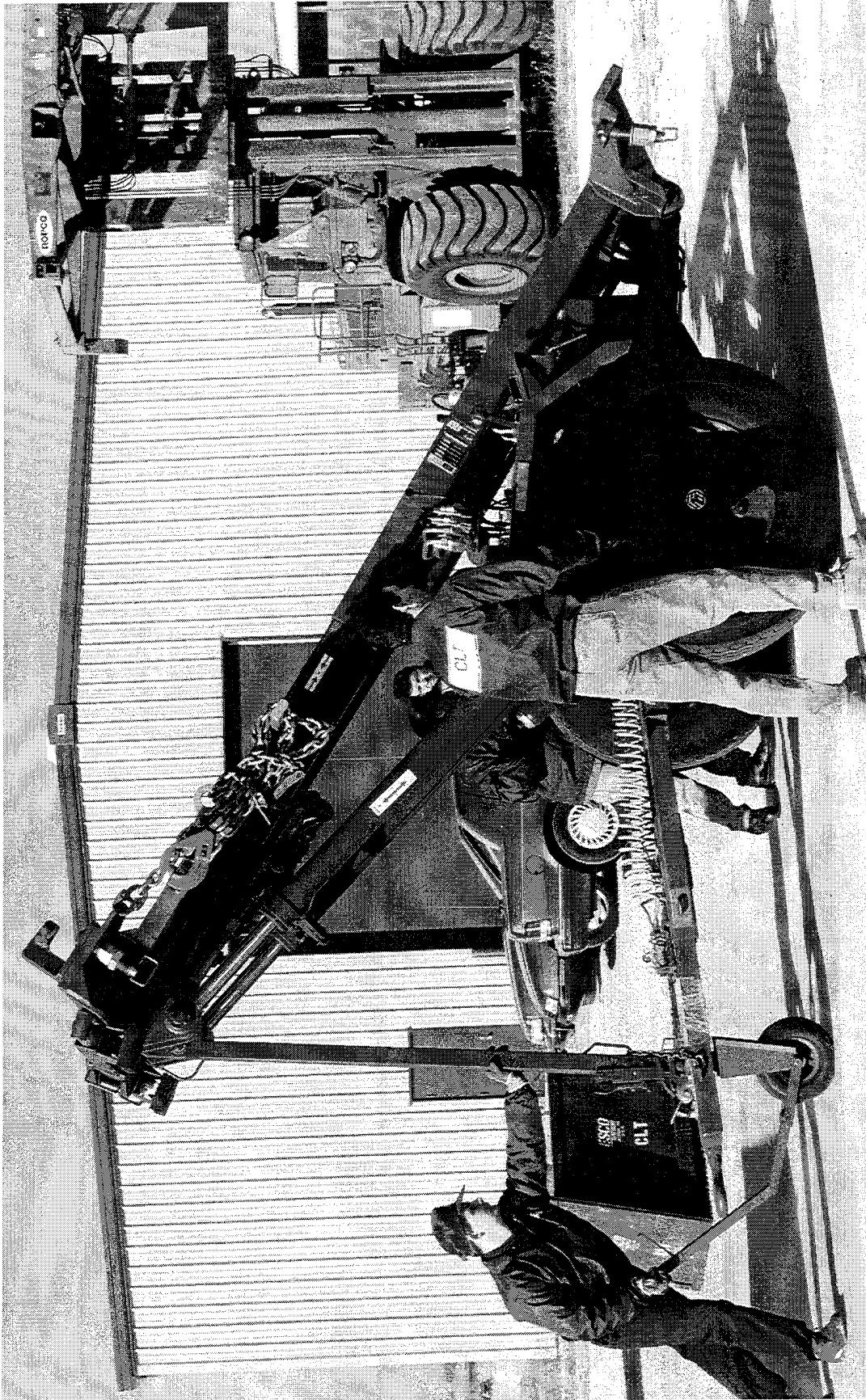




U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -  
SAVANNA, IL

AO317-SCN95-78-411 - This photograph shows the CLT system retracting the main hydraulic cylinders, placing the system in an upright position.

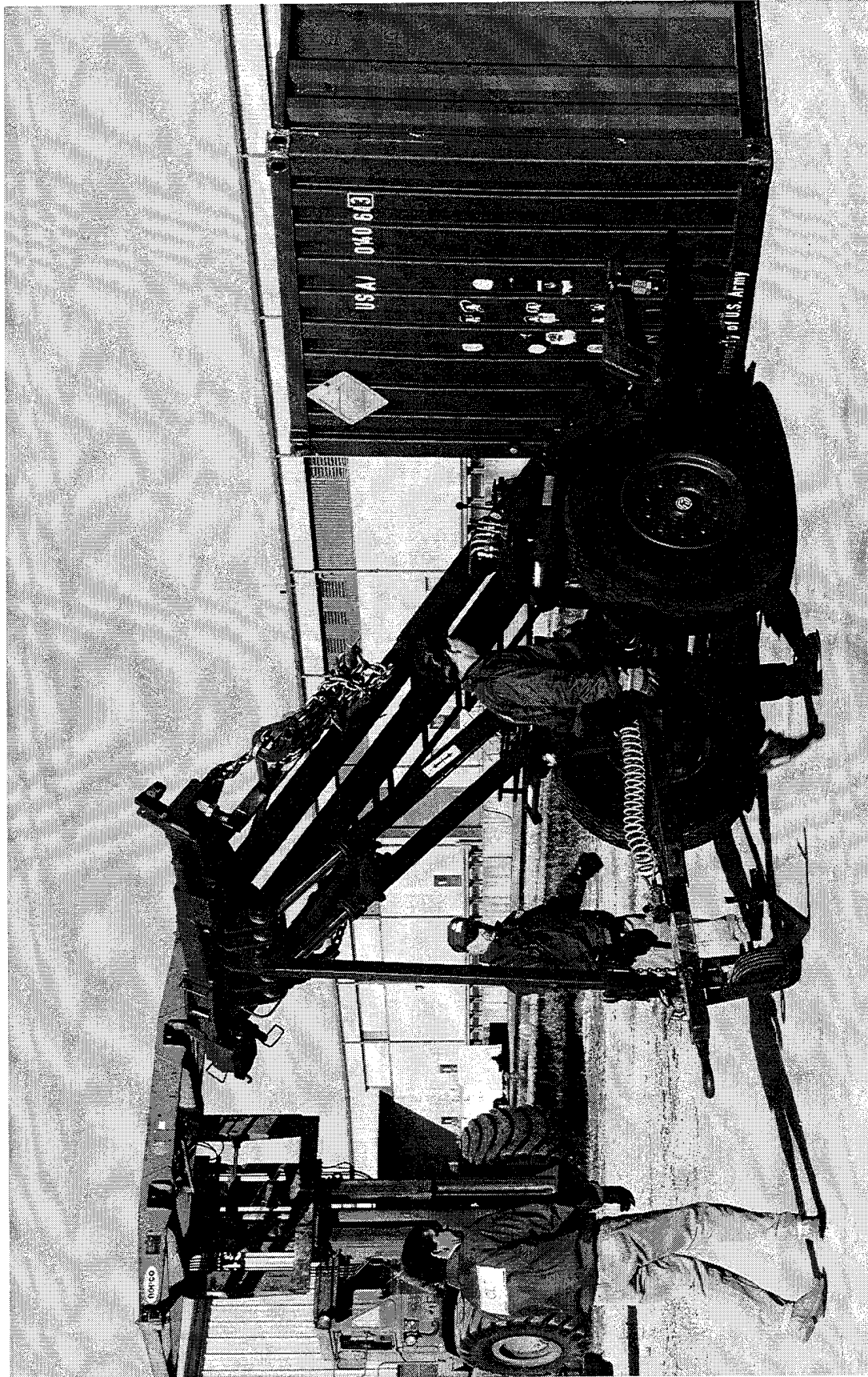




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AO317-SCN95-60-363 - This photograph shows the front section of the CLT system being manually pushed into position for attachment to one end of the MILVAN. Note the front section of the CLT system has no maneuvering system like the rear section of the system.

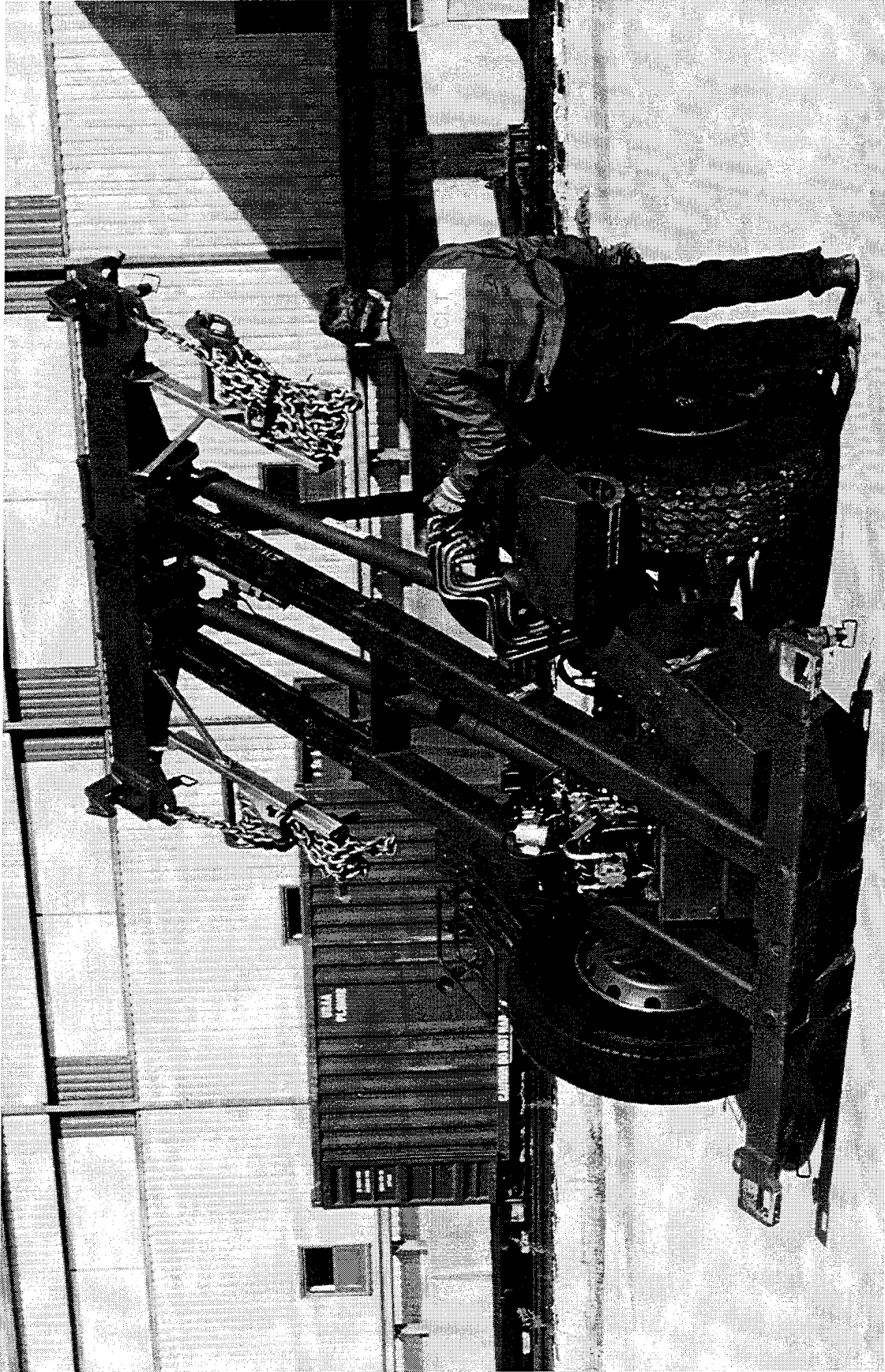




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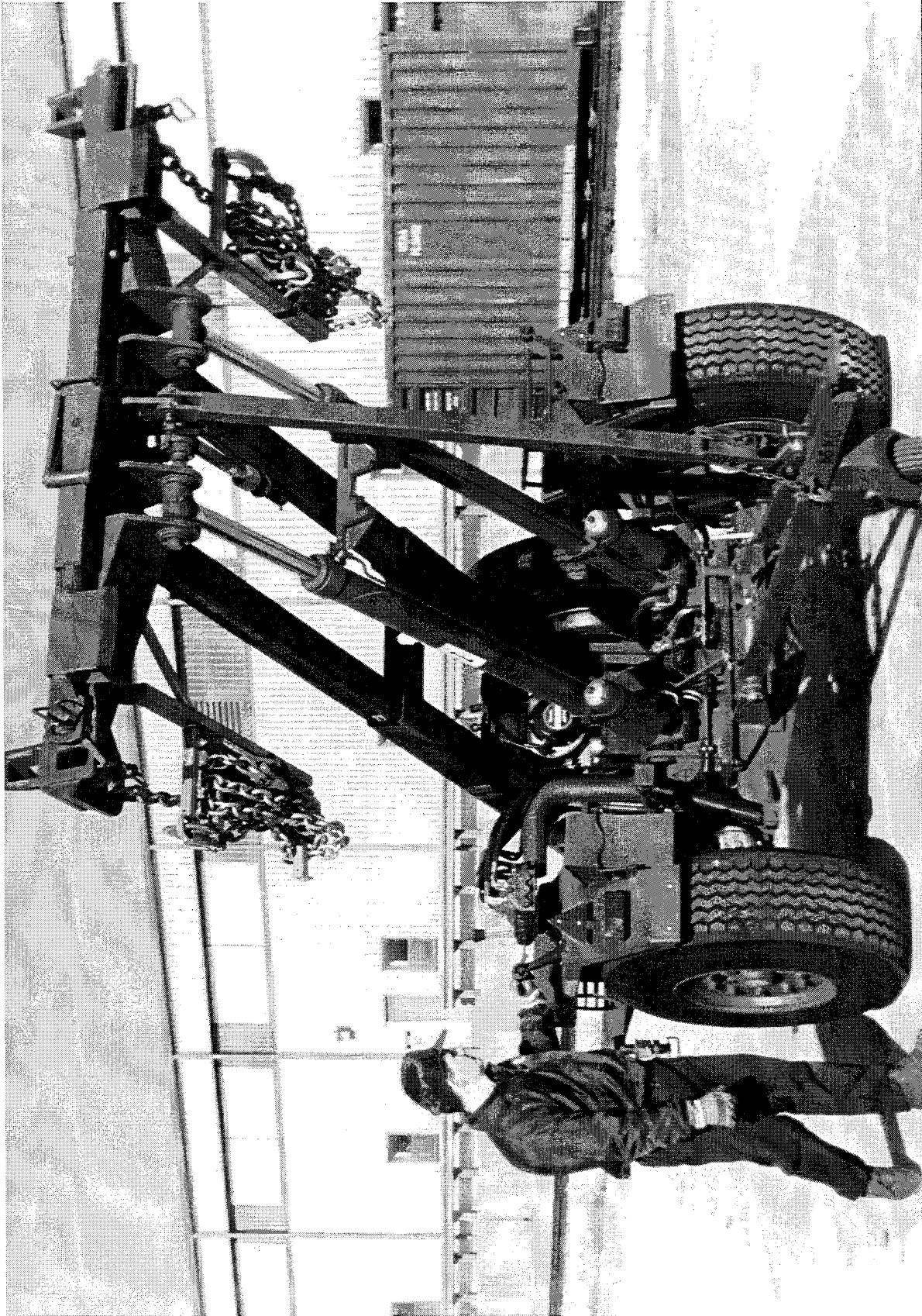
AO317-SCN95-78-362 - This photograph shows the front section of the CLT system aligned to the end of the container prior to attachment.





	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-78-412 - This photograph shows the rear section of the CLT system. Note the hydraulic maneuvering wheels next to the main wheels.		

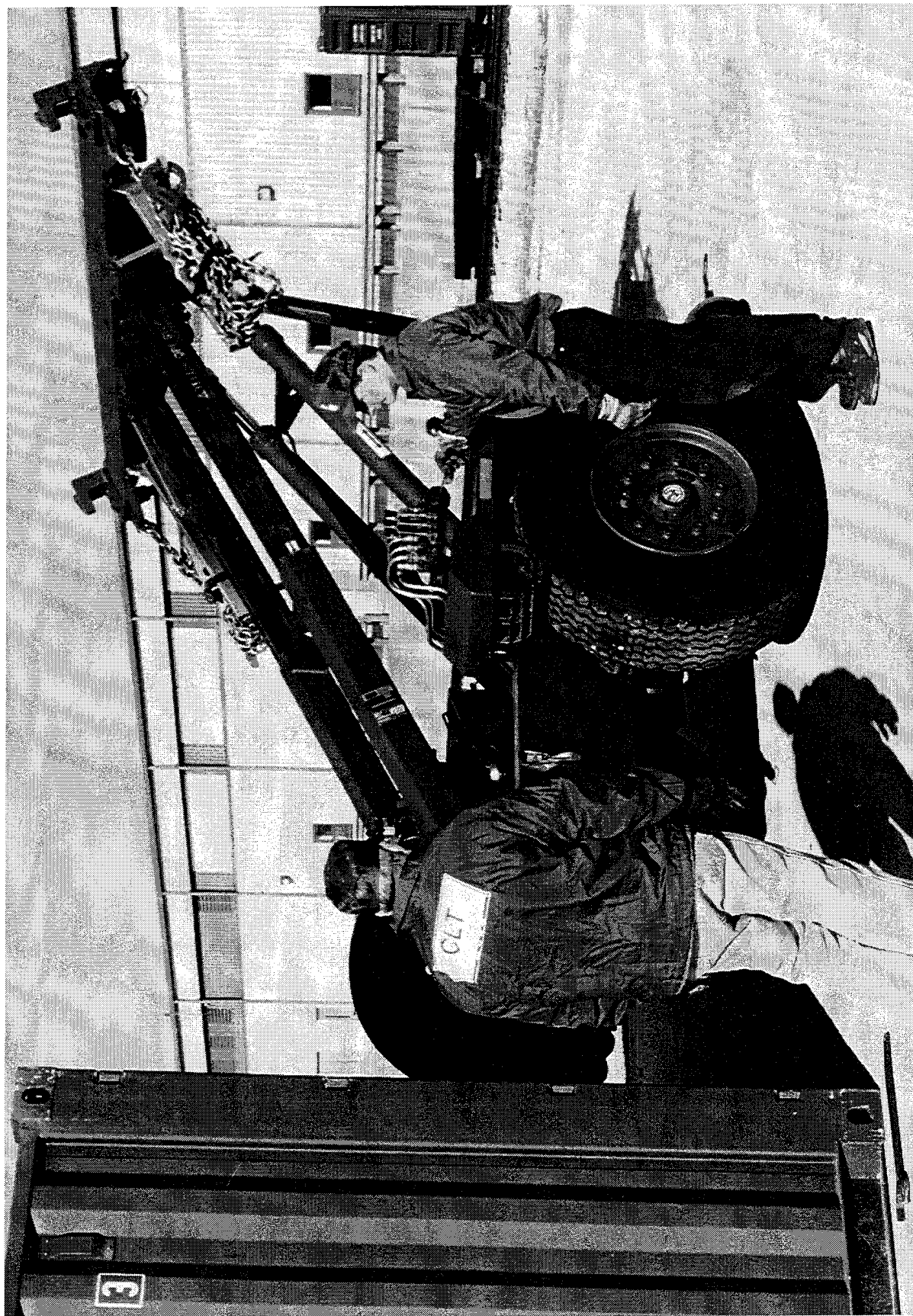




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AO317-SCN95-60-414 - This photograph shows the rear section of the CLT system being maneuvered with the hydraulic maneuvering system.

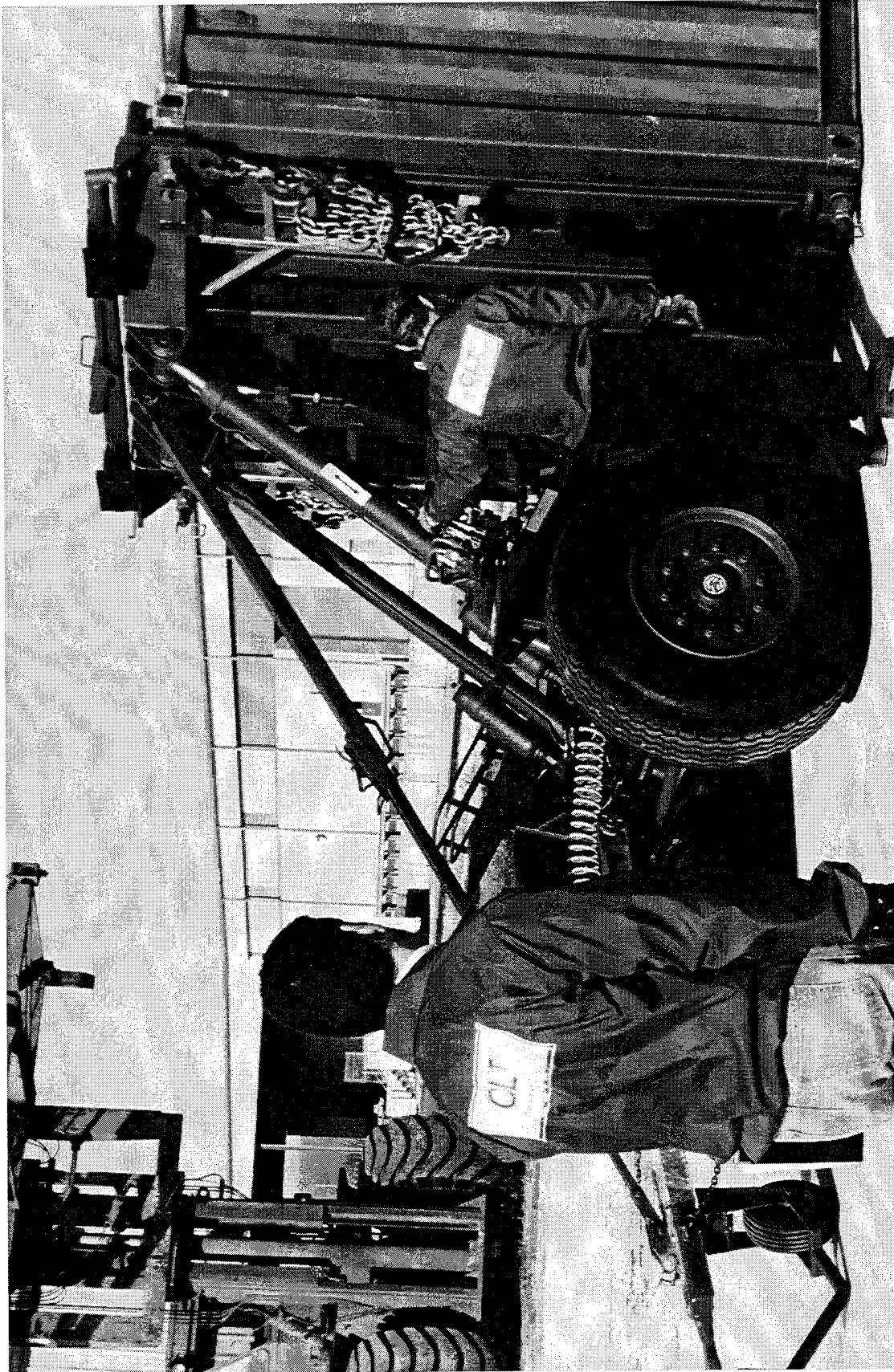




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AO317-SCN95-78-415 - This photograph shows the rear section of the CLT system aligned with the end of the MILVAN prior to attachment.





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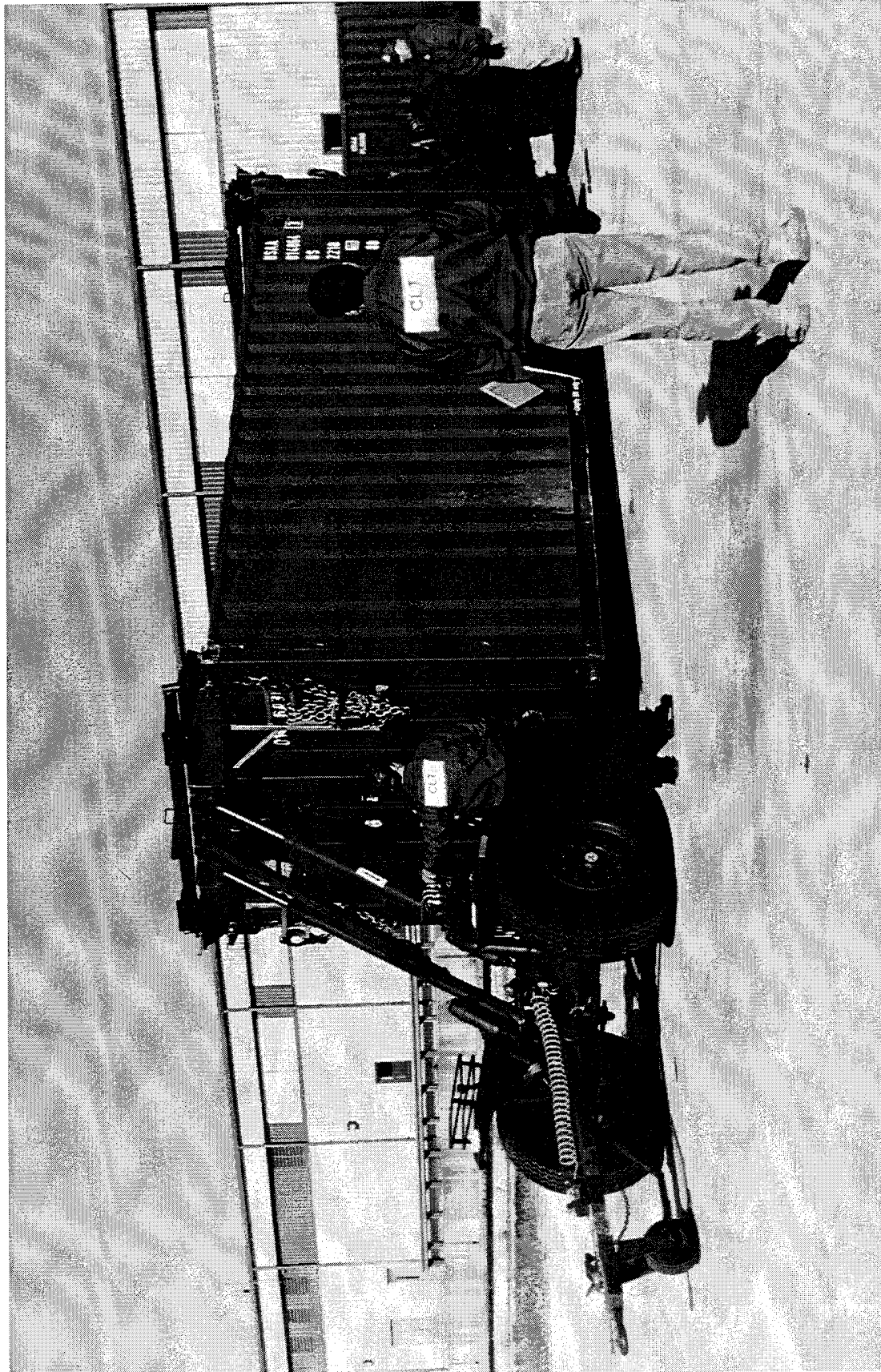
AO317-SCN95-78-407 - This photograph shows the CLT system being attached to the end of the MILVAN.  
Note how the CLT system is initially hooked into the upper corner fittings.





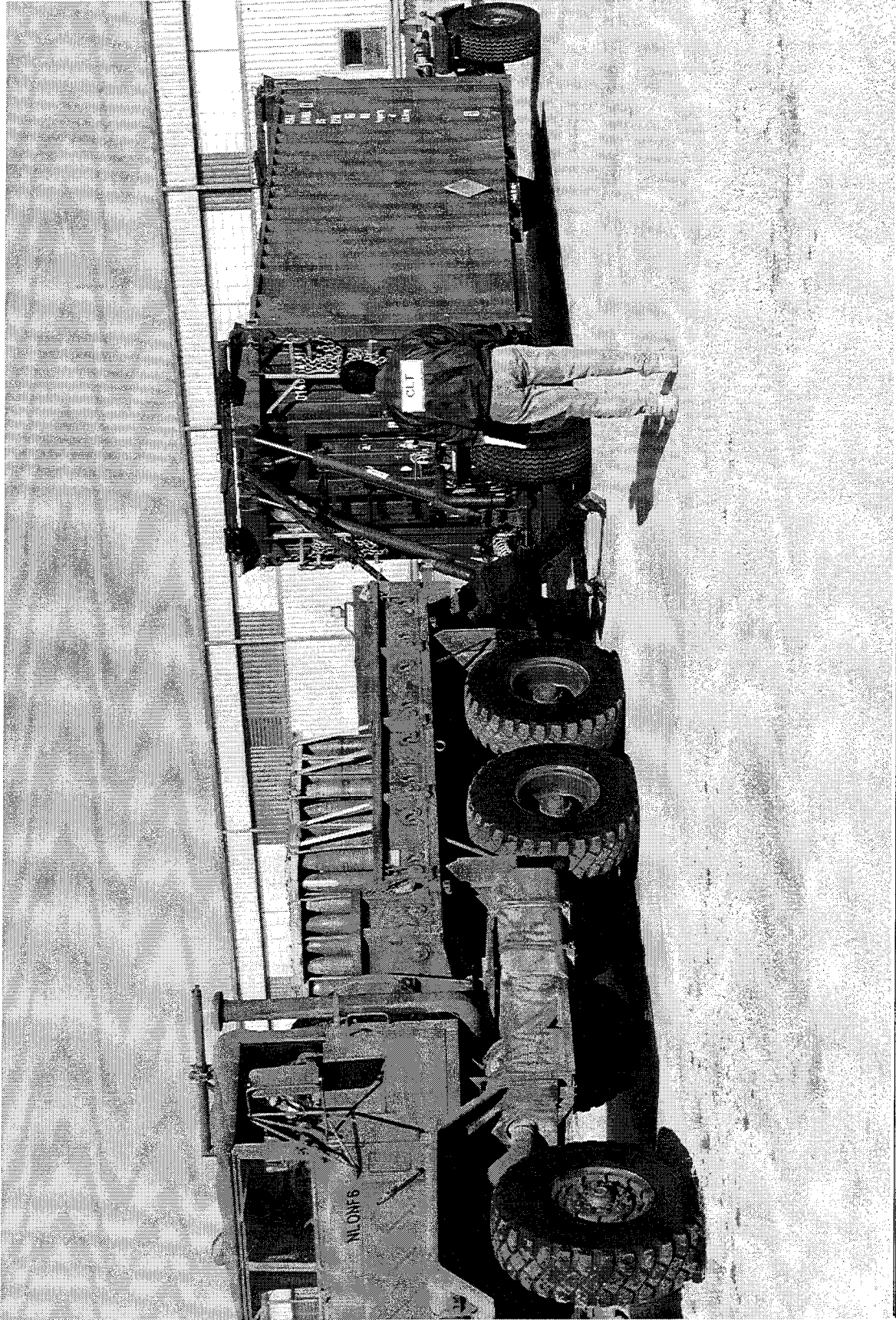
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-78-406 - This photograph shows the CLT system being attached to the end of the MILVAN. Note the hydraulic cylinders have been adjusted so the system is now flush against the end of the container, allowing the T-bolts to be inserted.		





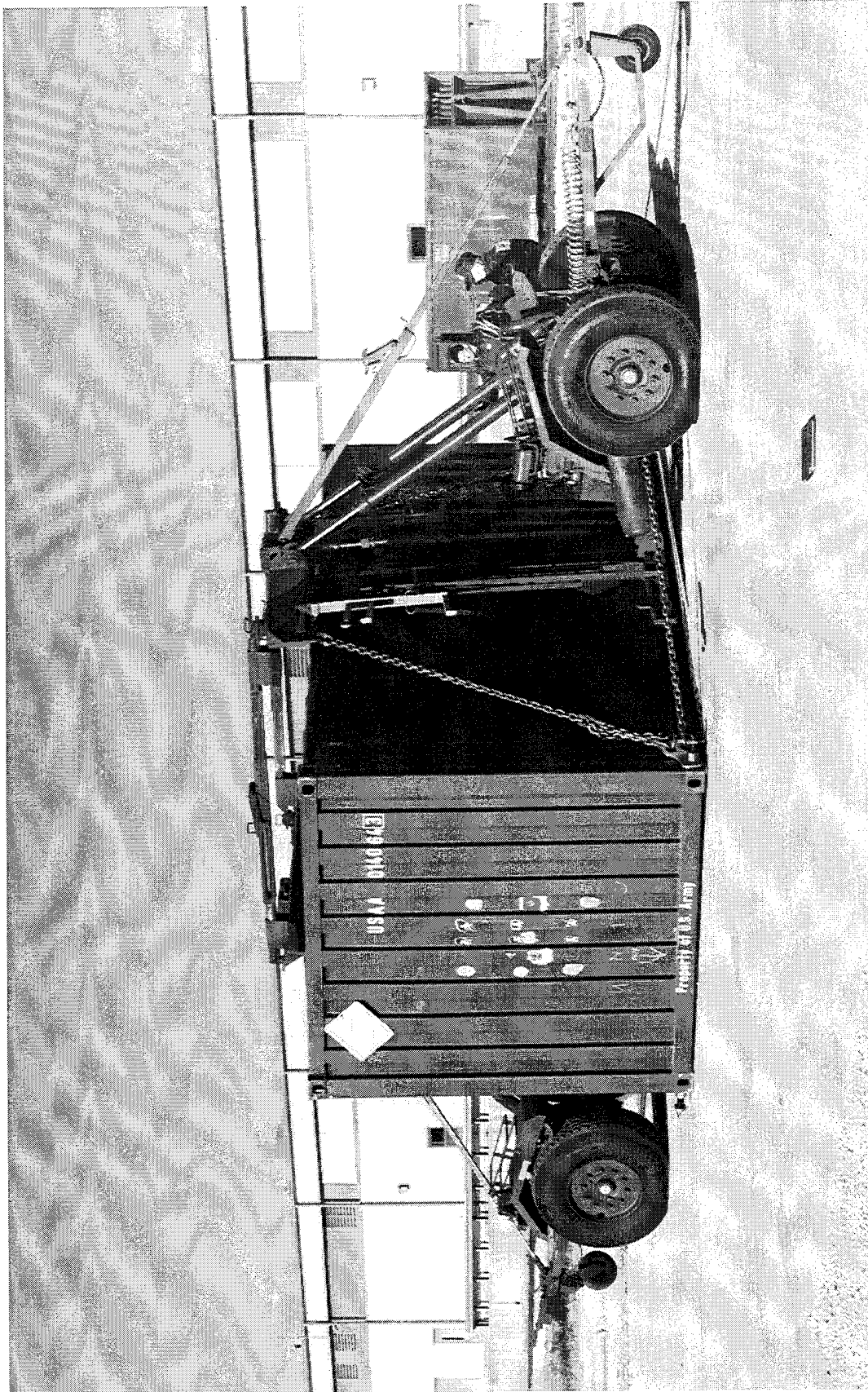
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
	AO317-SCN95-78-409 - After the insertion of T-bolts into the lower corner fittings, the CLT system was ready to raise the MILVAN.	





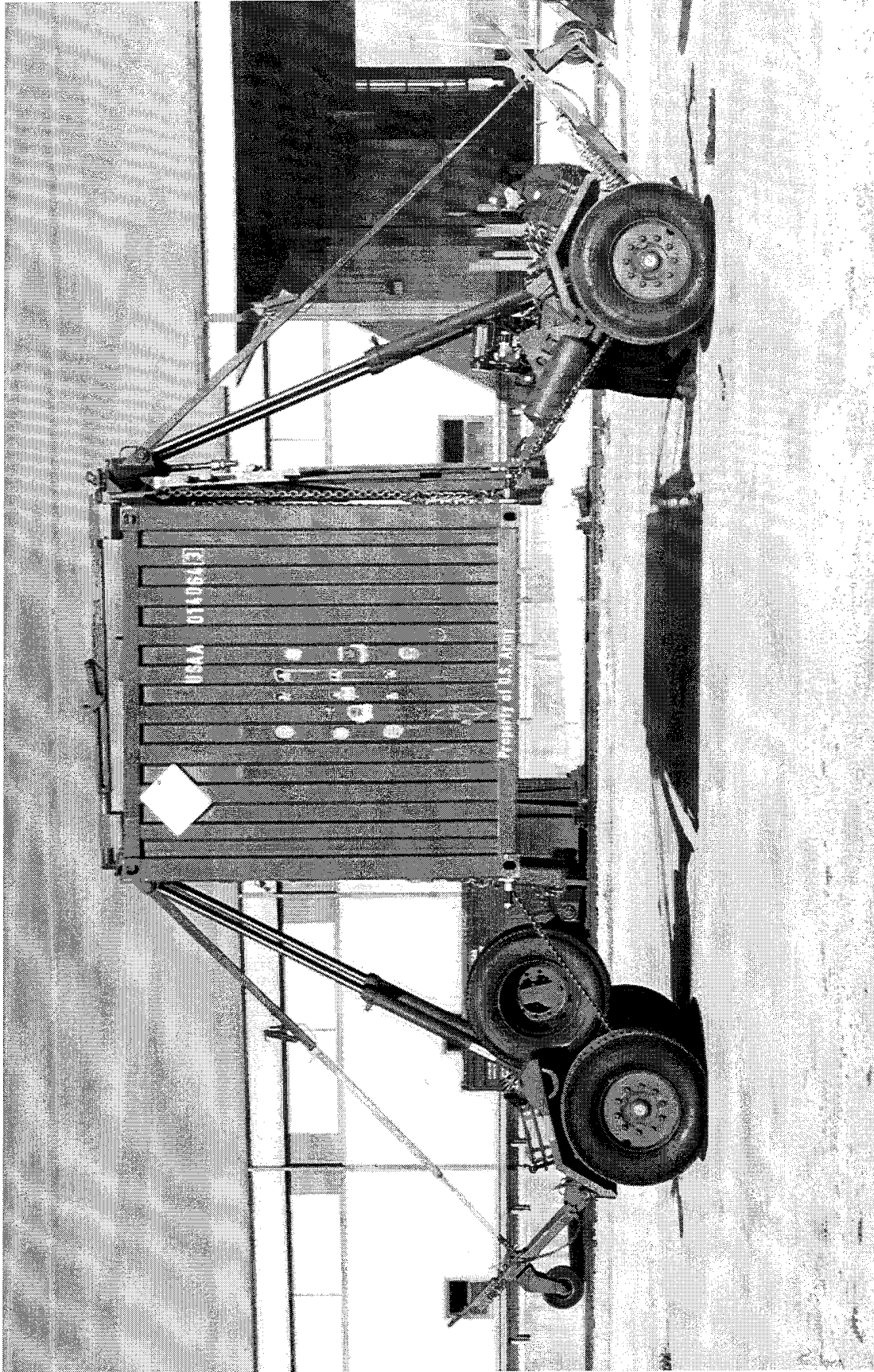
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-364 - This photograph shows the CLT with the MILVAN raised to transport level.		





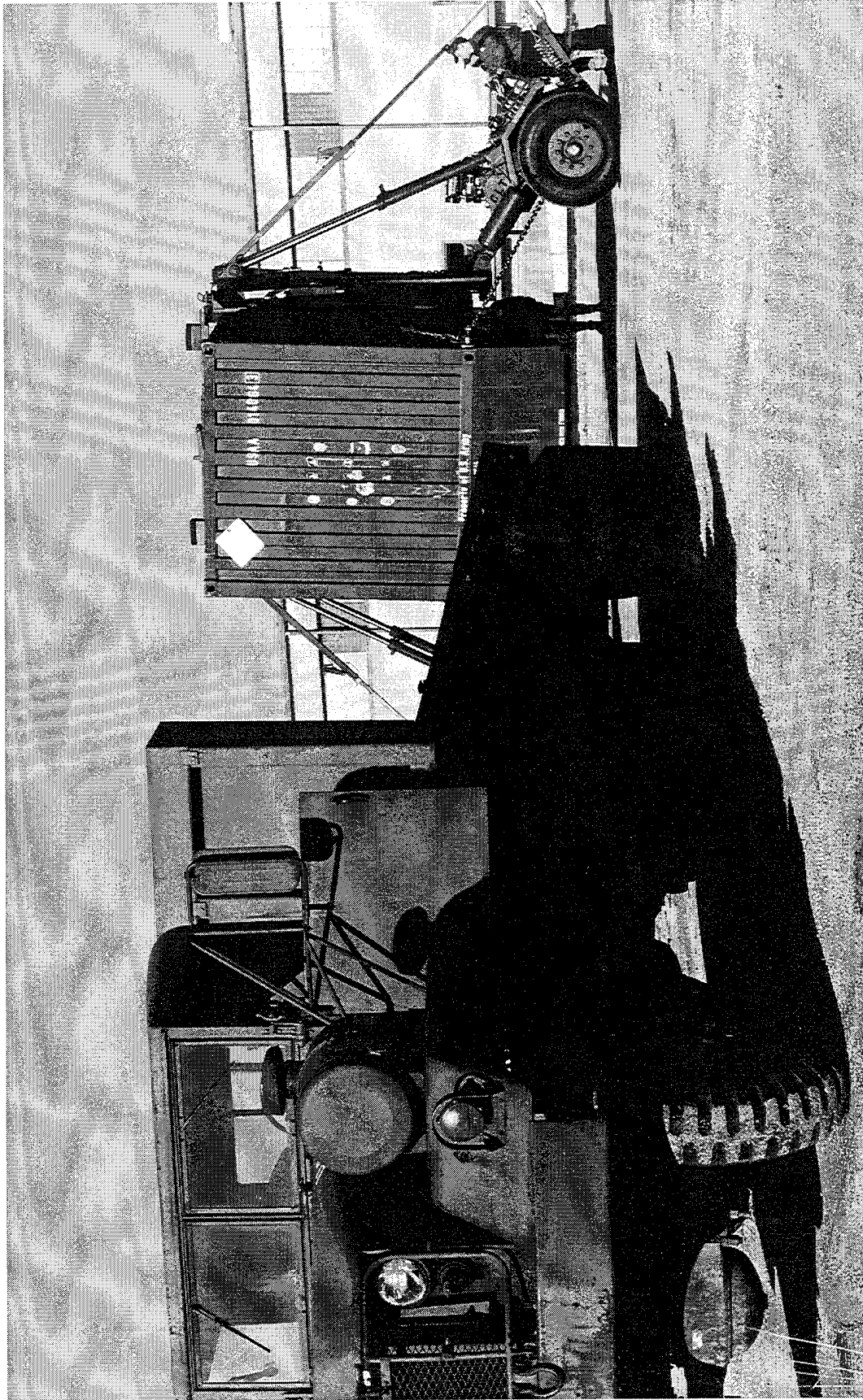
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-344 - This photograph shows the CLT system setup for a side lift of the MILVAN. Note the crossbars across the top of the MILVAN. These crossbars keep the CLT units from crushing the top of the MILVAN.		





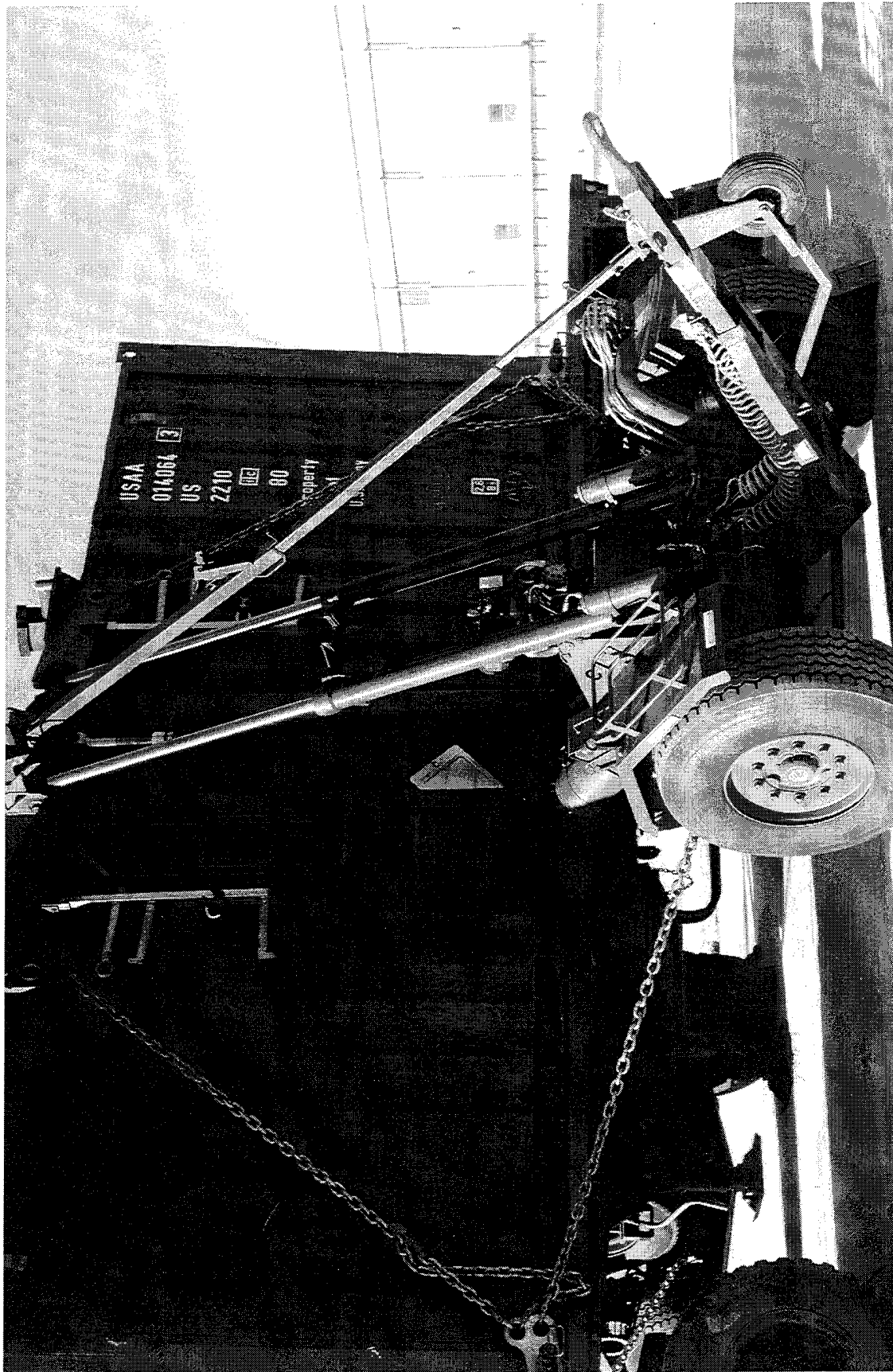
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-345 - This photograph shows the CLT system lifting the MILVAN by the sides.		





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AO317-SCN95-78-346 - This photograph shows the M872 semitrailer being backed under the MILVAN. The lateral tolerance between the semitrailer and the CLT system was minimal, so backing the trailer into position was difficult.		

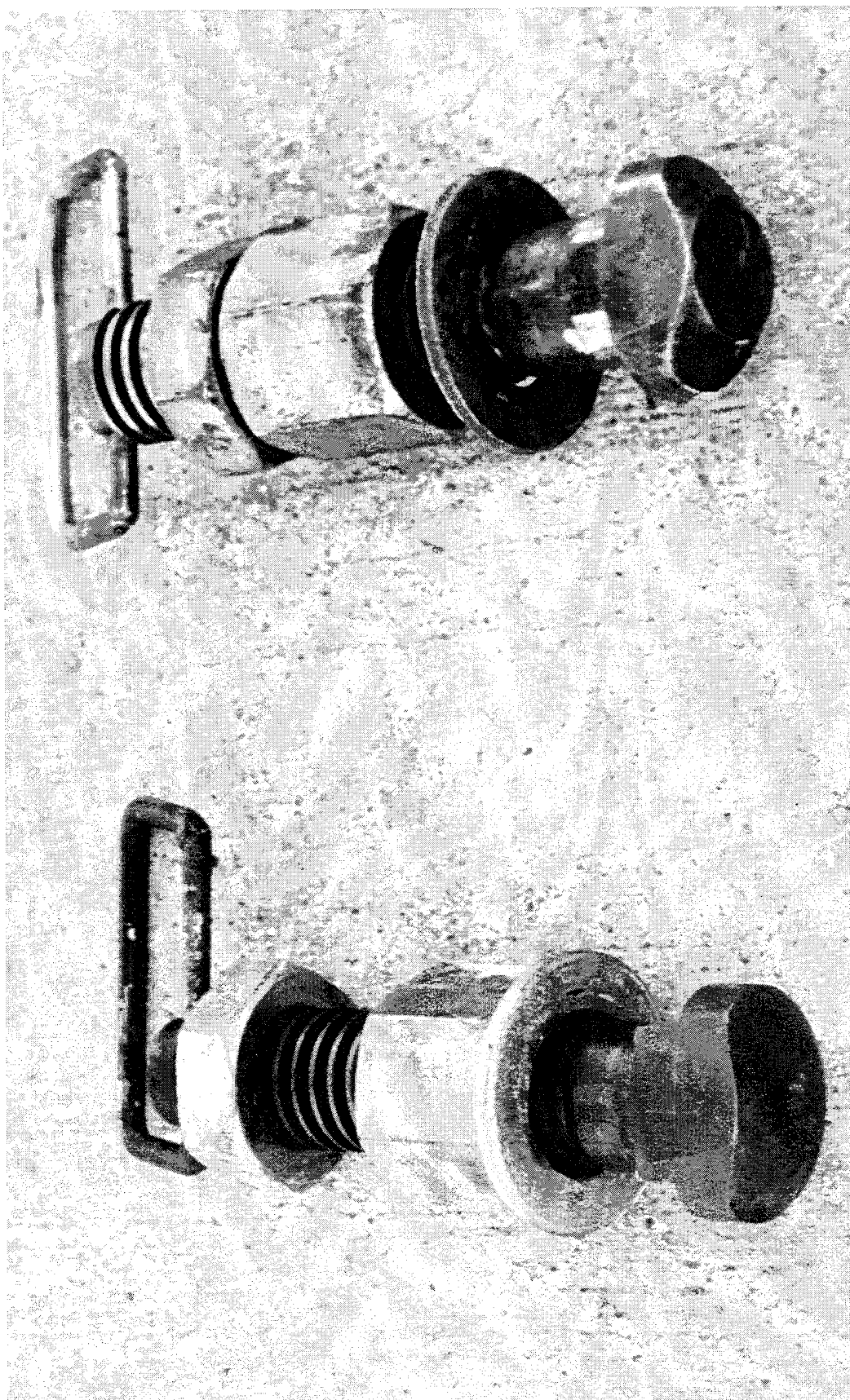




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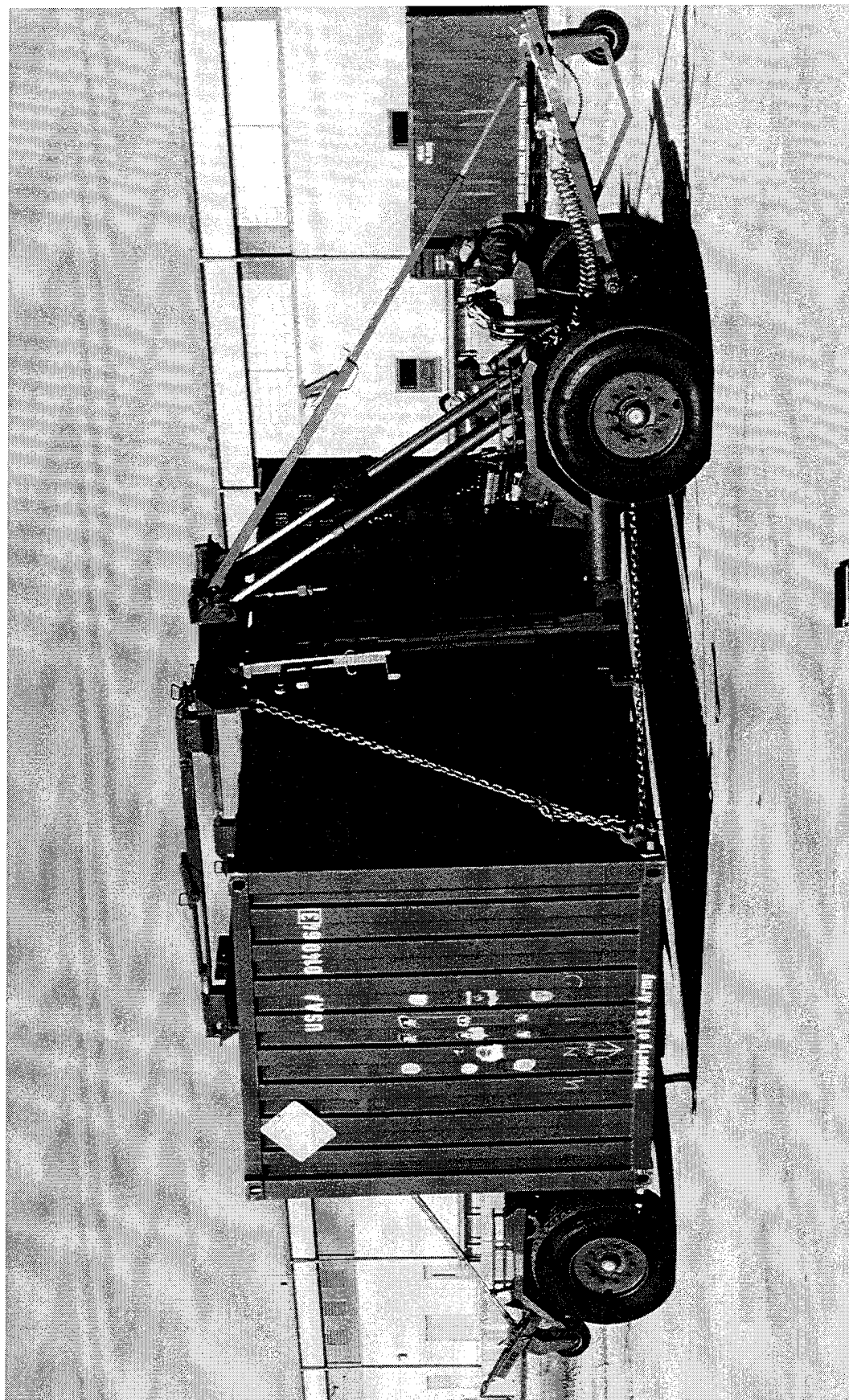
AO317-SCN95-60-349 - This photograph shows the wheel chocks that were used to help align the MILVAN corner fittings with the M872 semitrailer tiedown fittings. Note the personnel ladder that is built into the CLT system to provide easy access to the top of the MILVAN in order to connect the crossbars overtop of the MILVAN.





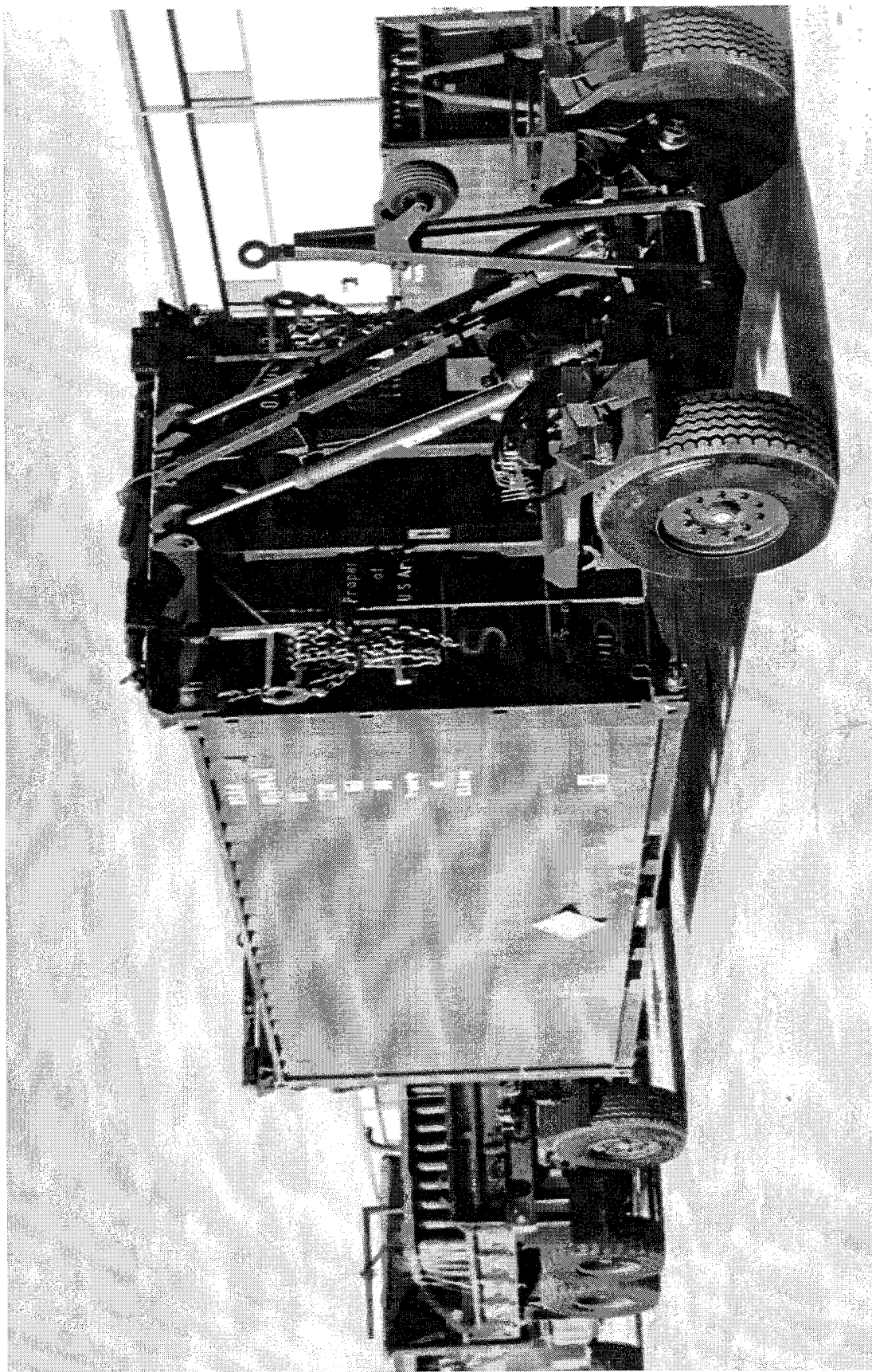
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-78-396 - This photograph shows the amount of metal that had to be removed from the T-bolts due to the tolerance problems with the M872 semitrailer tiedown fittings. This problem was noted when attempting to remove the MILVAN from the trailer.		





	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-78-410 - This photograph shows the CLT in a side-lift configuration with the MILVAN partially raised. In this configuration, it is possible to move the MILVAN laterally as long as movement is restricted to a straight line.		





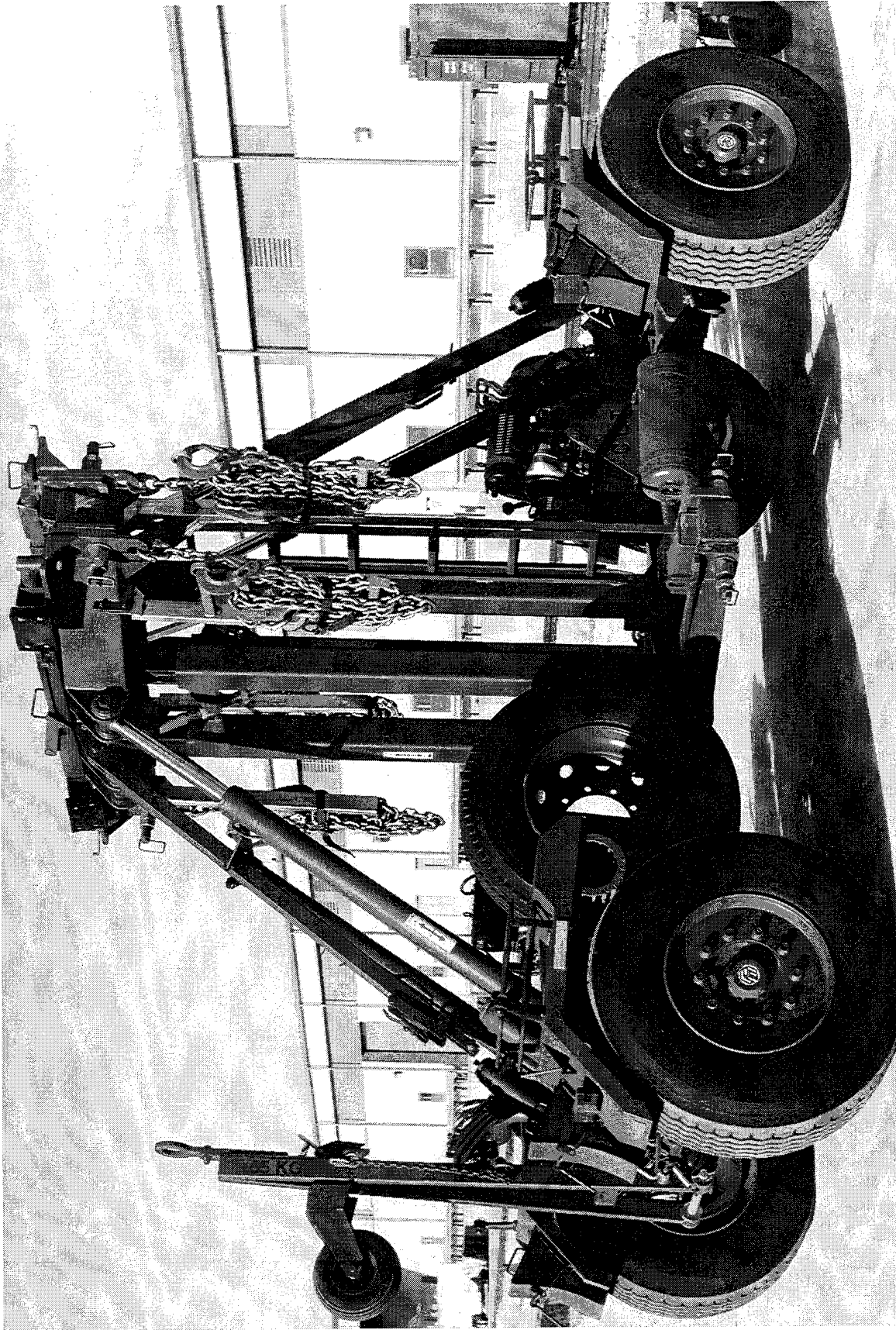
	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-387 - This photograph shows the CLT connected to the MILVAN prior to traversing the road harzard course. Note the air hose connecting the front and rear sections of the CLT system.		





	U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL - SAVANNA, IL	
AO317-SCN95-60-386 - This photograph shows the CLT system on the road hazard course.		





U.S. ARMY DEFENSE AMMUNITION CENTER AND SCHOOL -  
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AO317-SCN95-60-353 - This photograph shows the CLT system configured for towing without attachment to a MILVAN.